Choosing Plants
Sussex Elementary School
Baltimore County Public Schools

Case Study: Forests

Sussex Elementary School is located adjacent to Duck Creek in the Essex area of Baltimore County. Since 1990, teachers have been developing and implementing an environmental education program which has been successfully integrated into all areas of the curriculum. The project coordinator, Kathy Olver Brauer, says that the school staff has attempted to infuse environmental education into every facet of the students' school experience. Teachers have been provided with extensive staff development. The program emphasizes a hands-on approach, giving students not only information but also many opportunities for real world experiences.

An integral part of the program is the school's partnership with the Baltimore County Forestry Board. The board has assisted at nearly every step of the program by providing guidance, resources, and funding.

The project began in the Spring of 1990 with a Baltimore County Board of Education staff development grant of $500 to provide training on wetlands. In the summer of 1990, the Board of Education awarded the school with a teacher incentive grant of $12,000, for the Duck Creek Project. These funds provided staff development and materials related to wetlands and environmental education. In the spring of 1991, the Baltimore County Forestry Board made training available and provided trees and shrubs to plant along Duck Creek as a buffer zone.

Since 1991, teachers have developed and implemented a summer environmental education camp for elementary students. After-school programs have included environmental science, water monitoring, and schoolyard reforestation. Middle and high school students participate in these programs to earn service learning credits.

In 1991, the Chesapeake Bay Trust provided funding to produce a newsletter, *Duck Creek Quarterly,* on environmental education for teachers in Baltimore County. In 1994, the Trust provided funding for additional plantings in the buffer zone. Also, in 1994, the Chesapeake Bay Trust and the U.S. EPA provided funding to create an environmental telecommunication network for elementary schools. Training included: Save Our Streams, telecommunications, and the Baltimore County Forestry Board Schoolyard Reforestation Program. Participating schools were provided with telecommunication equipment, guides, and water quality testing materials. This aspect of the project was presented at a Maryland Association of Science Teachers annual meeting.

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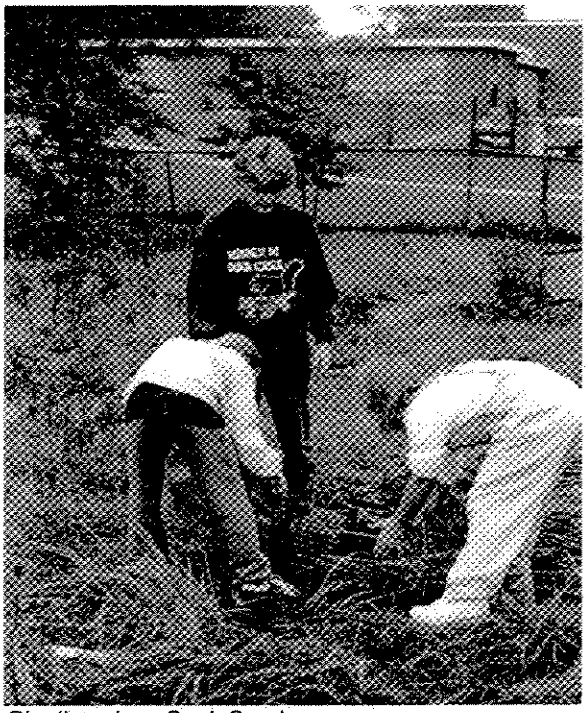
In 1994, the Baltimore County Forestry Board and the National Tree Trust provided seedlings, potting soil, and pots to establish a schoolyard nursery. Students pot seedlings and allow them to grow for one year at which point they are planted in the creek buffer zone. In 1998, the Baltimore County Forestry Board provided trees and shrubs to expand the buffer zone along the creek. Planting involved students, teachers, and parents.



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Environmental education is an ongoing part of the curriculum at Sussex Elementary School. Additional activities have included garden projects, specialized staff development, development of a nature trail, water safety, hatching and releasing yellow perch, and water quality monitoring.

Environmental Enhancement

From the mountains to the Chesapeake Bay and the shores of the Atlantic Ocean, forests contribute greatly to the quality of life. Air quality is enhanced by forests which reduce atmospheric carbon dioxide through photosynthesis, filter particles, and absorb nitrates. Streams and associated aquatic life benefit from having forests anywhere in their watershed. Forests promote groundwater recharge as rain trickles through leaf litter into the ground. Clean, local groundwater is critical in maintaining stream water quality and a healthy balance of aquatic life. Forests moderate water temperature through shading and reduce the amount of sediment and other pollutants entering streams. Forests provide habitat for numerous plants and animals, and also provide recreational opportunities for people.

Regulations

Early in the 19th century, much of Maryland's forest cover had been cleared for agriculture or cut for fuel, timber, or charcoal. Currently, the loss of forest cover occurs primarily as a result of increased urban development. Unlike forest clearing for agriculture, clearing for development typically eliminates the regeneration potential of forests.

In 1990, the Governor's Task Force on Trees and Forests was created to assess the problems facing Maryland's trees and forests, identify solutions to these problems, and promote good land stewardship and protection. One recommendation was the creation of a forest conservation, protection, and reforestation law. The Maryland Forest Conservation Act subsequently was passed by the General Assembly in 1991 and most recently amended in 1997 and 1998 to conserve the State's forest resources during land development.

For all major school construction projects both new and renovations/additions, the requirements of the Maryland Forest Conservation Act and Regulations must be addressed. The Forest Conservation Act and Regulations (NRA Title 5 Subtitle 16 and COMAR Title 8 Subtitle 19) apply to any activity that requires an application for subdivision, grading, or sediment control permit on areas greater than 40,000 square feet. A forest stand delineation report and a forest conservation plan for the site must be submitted for approval to the Maryland Department of Natural Resources (MD DNR) Forest Conservation Program prior to permit approval. These plans are prepared by

a Maryland licensed forester, Maryland licensed landscape architect, or other qualified professional. The forest stand delineation report includes an environmental features map as well as specific information on the existing forest and other natural features on the site. The forest conservation plan indicates the amount of forest disturbance, the methods to be used to protect the remaining forest, and the reforestation or afforestation required for the project. Planting must meet the stocking and survival requirements as stated in the regulations and must also have a two-year maintenance agreement that requires a percentage of the stock to survive for two years. Any planted or retained forest must have a long-term protective agreement that provides for the protection of the afforestation and reforestation areas. This protection allows for uses that are consistent with forest conservation, including recreation.

Planning, Design, and Construction

Conserving as much forest as possible on a construction site is an economical and environmentally sound practice. Temporary stormwater management during construction is lessened and permanent stormwater management requirements are reduced. Another benefit is that the more forest that is retained, the lower the forest mitigation requirement. For the forest remaining on a site, a forest stewardship plan can be developed by the county forester to meet the objectives for the forest. These objectives can include educational opportunities, wildlife habitat, safety, and income.

Some consider grass a less expensive alternative to planting trees. Grass costs less to plant than trees and may require less site preparation. However, grass will represent significantly greater long-term maintenance costs.

Compliance with the State Forest Conservation Program will require field work (a forest stand delineation report) and the preparation of an additional construction plan (a forest conservation plan). The forest stand delineation identifies the existing forest cover and environmental features on the proposed development site. The forest stand delineation plan should be completed prior to proceeding with the schematic design phase of a project. The forest conservation plan indicates the limits of disturbance for the proposed project, the mitigation planting plan, and how existing forested and sensitive areas will be protected during and after development. This plan is part of the site plan and construction bid package. It is submitted to the State Forest Conservation Program for review at the same time as the application for grading or sediment control permit is submitted for review to the appropriate agencies.

The planting of trees involves the purchase of planting material, some site preparation, and maintenance to ensure survivability. This work is usually part of the landscape/planting contract. A warranty is typically part of the contract and this covers the plants survivability for the first two years.

There are three types of planting stock readily available for school sites: seedlings, containerized, and ball and burlap. Seedlings are an average of 12 to 15 inches in height. Containerized plants are sold in pots. Ball and burlap are larger. It is recommended that the future use of the site be taken into account when determining the planting material. A mix of planting material is also recommended. Larger planting stock, ball and burlap, and containerized stock, can be located closer to high use areas while smaller material (seedlings) should be planted in the low use areas or behind the larger stock.

Site preparation and maintenance may be required, depending on the site. Site preparation may include, for example, disking and fertilizing the ground. Maintenance can include watering, pruning, and insect and disease control.

School Projects for Trees and Forests

Often schools are built on old farmland or a forest area that is cleared. Typically individual, widely spaced trees are then planted, which, although valuable, do not make the land considered forested. Forests are valuable because they not only provide food, shelter, and cover for many animals, but they reduce runoff by soaking up water and filtering out impurities, cool the air and recycle carbon dioxide back into oxygen. The forest floor, with its bed of leaves and plants, acts as a sponge to soak up rain. It also provides additional habitats because of the decay that is occurring there.

A variety of trees is important to an area because they provide for the different needs of the many animals that use them. Some trees produce seeds or nuts that are food for birds and squirrels. A large oak tree can provide enough acorns to feed many animals. Other trees produce a fleshy fruit used by birds and insects.

Trees of different sizes are necessary to create an overstory and understory in the planted forest. Some birds nest low to the ground while others will only nest high in the canopy. Birds of prey need tall trees for perching while other birds use the branches of smaller trees to hide.

There are many tree planting projects that may be helpful to conserve or enhance the natural environment of the school site. Among the projects that can be accomplished are:

Riparian Forest Buffer - Trees planted along streams are recognized as effective in protecting water quality. Forests filter sediment and control runoff. A stream buffer should extend a minimum of 25' plus four additional feet for each one percent of slope on either side of the stream.

Slope Plantings - Tree and shrub planting on slopes can be an effective means of reducing mowing and the potential for erosion.

School Forests - A selected area can be planted in seedlings or saplings. Subsequent outdoor activities may include the study of how trees grow and how factors such as insects, disease, and nutrient uptake influence tree survival and growth.

Forest Nursery - Seedlings are potted, grown, and cared for by students and staff until they are large enough to be transplanted. Contact Forestry Board or TREE-MENDOUS Maryland for information about seedlings, pots, and soils.

Screening/Shading - Trees can be planted to serve as a screen, suppress winds, add aesthetic value, or provide shade to a play area, building, or parking lot.

Chesapeake Bay School Reforestation Project

This program is designed to promote environmental protection and education through planting trees on school grounds. The goal of the project is for students and the school community to organize and implement the planting of a native forest to demonstrate its potential for improving the quality of the Chesapeake Bay, local streams and waterways, and wildlife habitat.

The project involves a broad spectrum of citizens through a cooperative effort of public school systems, County Forest Conservancy District Boards, the MD DNR Forest Service, local governments, and the private sector.

With direct student involvement, the school staff develops activities that integrate with school curriculum. Projects include an evaluation process and follow-up care and maintenance program demonstrating ownership and commitment to the planting site. The forester checks the sites periodically to provide advice on maintenance and management.

Local Forestry Boards select the projects to be considered for funding, then submit the project plans to the Executive Committee of the Maryland Association of Forest Conservancy District Boards. Grants are awarded to provide planting stock and materials which are ordered from local private nurseries or state nurseries.

Technical assistance is available from the MD DNR Forest Service. Foresters will assist in writing grant proposals and planting plans, and ordering planting stock and materials.

Forestry Boards have established more than 200 school forests under this project with sites in every Maryland county and Baltimore City.

Long Term Maintenance

Normally there is a one or two year plant survival warranty that is part of the planting contract. The State Forest Conservation Program requires a two-year maintenance agreement on the reforestation or afforestation planting plan as part of the forest conservation plan. If a planting contract includes a one year plant survival warranty, the school system is responsible for the second year of this requirement. For this reason, school systems should require a two-year plant survival warranty in the construction documents of a project. After this time period, the maintenance can be done by maintenance staff or students. Maintenance may include removal of the planting stakes and guy wires, yearly mulching, watering, pruning of dead limbs and branches, and insect and disease prevention.

Long term maintenance of planting areas or existing forested areas may be necessary to keep the forest healthy. A forest stewardship plan can be written that describes the necessary work and provides a timetable. The work may be done by students or professionals depending on the skill levels required.

Cost

Construction costs are dependent on the size of the site, the amount of forest disturbance, and the size of the reforestation or afforestation mitigation planting. The Forest Conservation Act allows for the removal of forests for development to a certain point before requiring reforestation to occur and requires afforestation if development occurs on a site without forests.

The costs involved in planting a school forest are dependent on plant material (size of material and species selected) and site preparation needed prior to planting. These costs will fluctuate based on the area of the state in which the planting site is located. The MD DNR Forest Service county forester will be able to assist with determining the planting material and site preparation needed prior to planting.

Seedlings can be purchased from the John S. Ayton State Forest Tree Nursery (1-800-TREESMD). Ordering must be done in late fall and the seedlings will be delivered in early spring. Seedlings are very reasonably priced and catalogs are available from the nursery.

Containerized plants can be purchased at most nurseries. Prices vary depending on container size, the nursery, and your location in the state. TREE-MENDOUS MD, a MD DNR Forest Service program, sells containerized trees and shrubs.

Ball and burlap plants can, like containerized plants, be purchased at any nursery. Prices vary depending on size, the nursery, and your location in the state. Generally ball and burlap plants cost more than containerized plants.

Preparation may be required for your planting site. This may include sod removal, tilling of the soil, and predigging holes for larger planting material. After the planting, post-planting site work will need to be done. This includes mulch and stakes. The costs for these items are variable and site dependent.

Student Participation

Students can, under the guidance of school staff, conduct site surveys and wildlife habitat assessments, write grants, develop schoolyard planting plans, and install and maintain the plants.

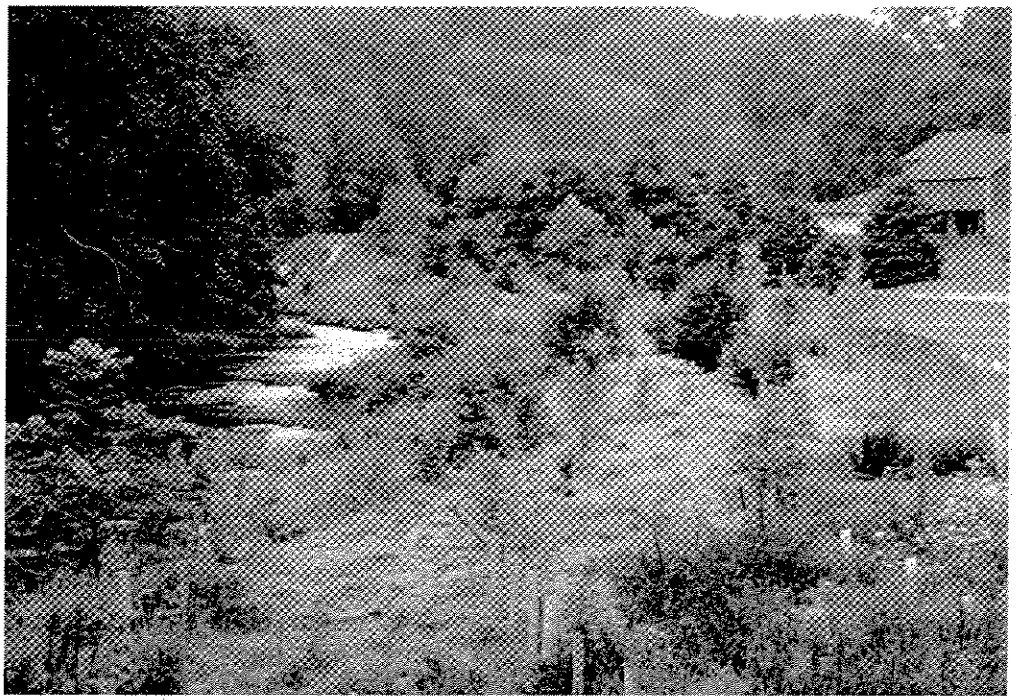
Site surveys require the students to inventory the existing site conditions and develop a map that reflects the information. This information is used to develop a school forest plan. With this information, a forest stewardship plan can be developed which guides the management of the forest to meet the objectives of the school. Objectives can range from wildlife habitat to creating access to study areas. The students can develop planting plans and plant material lists, and install and maintain plant material. Maintenance can include watering, nesting box care, pruning, filling bird feeders, and conducting structural repairs. In order to pay for the planting material, the students can apply for grants. Students can also write news releases about their projects.

Safety

As part of the forest stand delineation report, existing forest is evaluated to determine its ability to withstand and survive the proposed construction activity and future use of the property. Individual trees are also evaluated to determine if they pose a risk to construction workers or subsequent property users. Those areas considered at risk or that pose a risk to people may be targeted, when practical, as the area to be developed or for selected tree removal.

If there is a question about the safety associated with one or more trees on a school site, the regional forester should be contacted for an evaluation of the problem. The Forest Service will evaluate the situation and give recommendations on the proper action.

Planted areas, if designed and planted without safety in mind, can become a security issue. In areas where visibility is a priority, certain trees such as rows of conifers should not be planted. Deciduous trees and shrubs should be planted instead. Plant material can also be pruned to allow easier visibility. The MD DNR Forest Service can give recommendations on tree species and correct pruning techniques.



Riparian Forest Buffer
Eden Mill Nature Center